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Electrical Electronics
16/ENG04/037
ENG252 (Assignment 1)

$y' = ky$

$\frac{dy}{dt} = ky$

$\int \frac{dy}{y} = \int k\,dt$

$\ln y = kt + c$

$y = e^{kt+c} = e^{kt} \times e^{c}$

let $e^{c} = y_0$

$y = e^{kt} \cdot y_0 \Rightarrow y = y_0 \cdot e^{kt}$

from the equation

$y = 2y$

i.e $y_0 \cdot e^{kt} = 2y_0$

at $t = 5$ hrs

$2 = e^{5k}$

$\ln 2 = 5k$

$k = \frac{\ln 2}{5} = 0.1386$

Recall $y_0 = 20$ $k = 0.1386$

$\therefore y = 20 \times e^{0.1386t}$

b) $1\frac{1}{2}$ days $\equiv$ 36 hrs

$t = 36$ hrs

$y = 20 \times e^{0.1386(36)}$

$y = 2937.5532$

c) Solution As seen in the Excel document attached

d) Solution As seen in the Excel document attached

Increase in time and directly proportional to the increase in the population of the bacteria. i.e population growth of the bacterial in the ~~nutrient~~ growth medium rises followed by an increase in time.